

Revision 1: Glucoma – Lens – Errors of refraction

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1. Define the following.....

Glaucoma	A condition of Progressive optic neuropathy characterized by glaucomatous optic disc changes / glaucomatous visual field changes d₂ pathological increase of IOP. <i>P.O. / hypertension / long / Normal tension glaucoma</i>
Hypotony	A condition characterized by IOP less than 10 mm Hg.
Glaucomatous cupping	These are changes of optic disc 2^{ry} to glaucoma.
Buphthalmos	Pathological elevation of IOP 2^{ry} to (developmental anomalies) closing the angel manifested at birth / shortly after.
ACG	It is Acute increase of IOP d₂ (sudden closure of angle) associated with <i>Red eye</i>
Cataract	Opacification of crystalline lens.
Zonular cataract	Lens opacification involving one or more lamellae of the lens.
Complicated cataract	Lens opacification resulting from local eye / systemic disease.
Amblyopia	Impaired vision in absence of an organic cause mainly D₂ lack of use of 1 or 2 Foveae for vision → decreased V/A.
Lens Subluxation	Lens displacement d₂ partial absence / tearing of suspensory. lig (Zonules).
Lens dislocation	Lens displacement d₂ complete absence / tearing of (Zonules).
Scotoma	V.F defects surrounded by normal VF (islands of blindness).
Iridectomy	Removal of a portion of the iris.
Emmetropia	- A condition of refraction in which with "accommodation completely relaxed" - The incident parallel light rays come to focus point on the retina. - The rays coming out from the retina leave the eye parallel "meet at ∞".
Myopia	- A condition of refraction in which with "accommodation completely relaxed" - The incident parallel light rays come to focus point in front of the retina. - The rays coming out from the retina leave the eye convergent.
Hypermetropia	- A condition of refraction in which with "accommodation completely relaxed" - The incident parallel light rays come to focus point behind the retina. - The rays coming out from the retina leave the eye divergent.
Astigmatism	- A condition of refraction in which with "accommodation completely relaxed" - The incident parallel light rays don't come to focus point on retina.
Presbyopia	A physiological recession of near point (P.proximum) d₂ progressive weakness of accommodation power with advance of age. <i>Due to Nuclear sclerosis with age.</i>
Anisometropia	Significant difference in the refraction Power () the 2 eyes ≥ 4D.

Aphakia

2. Mention the functions of.....

Aqueous H	- Supplies avascular ocular structures as cornea & lens with O₂ and nutrients and removes waste products of metabolism "lymph of eye". - Maintains IOP (maintains shape of globe & regulates perfusion of ocular
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Gonioscopy <i>Angle</i> <i>Sheet</i>	- Examination of the angle of A. Ch using gonio-lens & slit lamp. ① Grading of ant.ch angle (open – narrow – closed). ② Detection of angle abnormalities: synechia & Neo-Vs. "Rubeosis iridis" ③ Operation of the angle: goniotomy.
OCT <i>Sheet</i>	- OCT of the macular thickness: diagnose M. edema – Choroidal new Vs. - OCT of the RNFL thickness: diagnose Chronic Glucoma.
Lens <i>Sheet</i>	- One of the refractive media of the eye "15-17D". - Accommodation "near vision". - Protect the retina from U-V: phototoxicity. - Maintains clarity and transparency.
Lens capsule <i>Sheet</i>	① Accommodation: d₂ its high elasticity. ② Semipermeable membrane: nutrients in and waste products out. ③ Protects the lens fibers from proteolytic enzymes of aqueous.
Lens epithelium <i>Sheet</i> <i>equatorial</i>	① Anterior cells: secretes anterior and posterior capsule. - Pyramidal cells: secretes the lens fibers. - Posterior sub capsular epithelium: in 1st trimester form embryonic nucleus.
Biometry "A-scan" <i>Sheet</i>	- Measures axial length of the eye: IOL power calculation & ant.ch depth. "B scan: detects Vit. Hge, IOFB, RD, IO tumors even in presence of opaque media as cataract or opaque cornea.
Auto-refractometer <i>طريقة قياس النظر</i>	- Automatic determination of the refractive error of the eye (myopia, hyperopia, astigmatism). - Determination of the (appropriate glasses) <i>8 & 6 glasses</i>
Retinoscopy (Skiascopy)	As above but Manual determination. →

3. Anatomy / Enumerate Layers of.....

Angle of anterior chamber <i>Sheet</i>	The recess () the periphery of the cornea & root of iris. Structures seen by the Gonioscopy: - Shwalp's line. - Scleral spur. - Root of iris. - Trabecular meshwork. - Ciliary band. Structures not seen by the Gonioscopy: - Canal of Schlem: endothelial lined canal at the limbus. - Aqueous veins: drain aq. From SH.canal to episcleral veins.
Lens	- Transparent avascular elastic biconvex structure suspended in its place by the Zonules. Gross anatomy: - Relations: "anteriorly / posteriorly / equatorially". - Measurements: "axis / diameter / radius / RI / R Power". Minute anatomy "Layers": ① Lens capsule: highly elastic, acellular membrane. ② Sub capsular epithelium: single layer lines the ant. Capsule & equator. ③ Lens fibers: form cortex and nucleus.

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- **Parts:**
 - **Lens capsule:** an elastic memb. Thicker anteriorly.
 - **Cortex:** lies () capsule and nucleus & consist of lens fibers.
 - **Nucleus:** has 4 nuclei (Embryonic / fetal / infantile / adult).
- **Nutrition:** by diffusion from the aqueous.
- **Composition:** water 65% / protein 34% / minerals 1%.
- **Functions:** see above.

4. Mention 5 clinical signs of....

Buphthalmos	• Cornea: (Diameter > 11 mm) / cloudy "hazy" / Haab's stria. • Sclera: blue sclera / broad limbus. • Lens: flattened & displaced backwards. → may lead to subluxation & dislocation • Gonioscopy: Reveals abnormalities of the angle. • Refraction: myopia but less than expected from axial length. → Tremulous Iris
ACG	• Cornea: hazy. → Red eye • Conj: marked Ciliary congestion. → optic Nerve = show hyperemic edema. • A.ch: shallow / • Pupil: (semi dilated / vertically oval) / irreactive. • IOP: Eye is stony hard on digital palpation.
POAG	• CCC by a triad of (High IOP / Glaucomatous cupping / Visual field defects) With open angle by Gonioscopy.
Glaucomatous cupping	• Early: - Large C/D > 0.4. - Notching of rim. - Splinter Hge at disc. • Late: - Large C/D > 0.7. - Nasal shift of vs and appears as if interrupted. • Vertical elongation of cup. • Asymmetry () 2 eyes. • Deep cup with undermined over hanging edge.
Congenital cataract	• Types: see later.
Zonular cataract	• With dilated pupil: Central opaque disc / peripheral spokes or riders "steering wheel" appearance.
Immature "incipient" cataract	① Lens: Shows greyish sectors. ② Iris shadow: Present. ③ RR: Black sectors against a reddish background. ④ IOP: Normal. ⑤ Capsule: Normal. ⑥ AC: Normal.
Mature cataract	• Lens: Totally opaque. • Iris shadow: absent. • RR: absent. • Capsule: Normal. • AC: Normal. • IOP: Normal.
Intumescent cataract	• Lens: swollen & shows water vacuoles. • Iris shadow: may be present. • RR: small areas may be seen red through water vacuoles. • IOP: high (Phaco-morphic glaucoma). • Capsule: stretched & glistening. • AC: shallow.

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Hyper mature cataract	• Lens: shrunken & totally opaque. • Iris shadow: may be present. • RR: Absent. • IOP: high (Phaco-lytic glaucoma). • Capsule: Wrinkled. • AC: deep.
Nuclear cataract	• Lens: central opacity. • Iris shadow: Present. • RR: Central dark disc in a reddish background. • IOP: normal. • Capsule: Normal. • AC: Normal. النقطة البيضاء في المنتصف في الفوق في اللون منشور
Complicated cataract	• <u>Posterior cortical opacity</u>: Rosette shaped / poly chromatic luster → later chalky white "cataracta gypsum". • <u>Vision</u>: always < expected from the density of opacity. • <u>Signs of a local disease</u>: high IOP in glaucoma. • <u>General examination</u>: for general cause. Phicia + Aphakia منشور في الفوق في اللون منشور
Lens subluxation	• <u>Oblique illumination</u>: Astigmatism → Eucor of Part of the Normal (lens edge may be seen through pupil / Iris: tremulous iris / Slit lamp: vitreous herniation through the pupil / A.ch: irregular depth).
Lens dislocation	• <u>Ant. dislocation</u>: - Lens becomes spherical as globule of oil in A. Ch. - High IOP d2 pupillary block. → Iris bombi → C.A.G. - Signs of complications & cause. • <u>Post. Dislocation</u>: as Aphakia but no scar or history of operations
Aphakia	• +ve history of operation (cataract surgery). • Scar of previous operation. • Pupil: Jet black. • A.ch: deep & Tremulous Iris • Iris: Iridectomy (peripheral / key hole) Tremulous Iris • Absence of 2 out of 3 purkinje-sanson images. → on Green Ant. Lens; Post. lens • Refraction: shifted towards HM. "hypermetropia" • Retinoscopy: with movement. في زى الحاد بعد ازاز العين مع انك مستغاف
Pseudo-phakia	• Normal refraction. • 2 purkinje-sanson images (.....). aphakia والباقي زي ال
Hyper metropia	• <u>Oblique illumination</u>: (signs of small eye) • <u>Fundus examination</u>: - Bl. Vs: tortuous. - Optic disc: Pseudo-papillitis. - RR: Bright RR. • <u>Retinoscopy</u>: with movement.
Myopia	• As HM but (العكس).....
Astigmatism	• Gross signs: e.g. keratoconus or c. opacities. • Landolet's chart: some opening in the same line are not seen. • Placido's disc: shows irregular circles. • Astigmatic fan. • Ophthalmoscopy: optic disc appears oval. • Keratometry: the curvature of the cornea can be measured. C

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Mention 5 complications of..

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Goniotomy <i>Sheet</i>	Pre-operative: complications of Retro bulbar anesthesia (retrobulbar hematoma - globe perforation - Optic nerve damage). سؤال Intra-operative: dry eye - traumatic injury to: iris /cornea / EOM. Post-operative: Iritis / Endophthalmitis // (under correction) <i>Remove PATT - not enough to improve the angle drainage - I.O.P. still high</i>
Trabeculectomy (Ext. Fistulizing) <i>Sheet</i>	Pre-operative: complications of Retro bulbar anesthesia (retro bulbar hematoma - globe perforation - Optic nerve damage). Intra-operative: dry eye - traumatic injury to iris /cornea /EOM. Post-operative: - Over correction: Hypotony "RD / Expulsive Hge" <i>إزالة جراحية كبيرة من العين</i> - Infection: Endophthalmitis. <i>so put mitomycin C</i> - Healing: glaucoma. <i>العين مغلقة ببطء</i> - Mechanical dysfunction of implant "valve failure"
I/A surgery Lensectomy <i>Sheet</i>	Pre & Intra-operative: as usual. Post-operative: - I/A: After cataract / iritis; hypotony - Lensectomy: RD / vitreous loss; <i>Posterior Capsular Opacification</i> <i>Dr. Muhamad Abu-elmaaty</i> <i>Anterior Capsule</i> <i>Posterior Capsule</i> <i>Proliferation</i>
Iridectomy <i>Sheet</i>	Pre-operative: complications of Retro bulbar anesthesia (retro bulbar hematoma - globe perforation - Optic nerve damage). Intra-operative: dry eye - traumatic injury to iris /cornea /EOM. Post-operative: - Diplopia: if not covered or large. - Hge: hyphema / iritis.
Cataract surgery <i>Sheet</i> <i>after hyalox</i>	Pre-operative: complications of Retro bulbar anesthesia (retro bulbar hematoma - globe perforation - Optic nerve damage). Intra-operative: dry eye - traumatic injury to iris /cornea /EOM. Post-operative: - IOL: Over corrected, under corrected IOL, tilting or falling into retina. - IO Hge / Iris prolapse / RD / Infection / Corneal decompensation / pupi.block.
Phaco-emulsification <i>Sheet</i>	As above + in hard cataract: high U/S waves → corneal endothelial damage, Iritis, wound burn. <i>In the Retina</i>
LASIK <i>Sheet</i>	Intra-operative: (wrinkling of flab / complete / incomplete cutting of the flab - bulging). Post-operative: Over / under correction.
Contact lens	- Microbial keratitis: bacterial / acanthoemba. - Allergy in certain individuals: giant papillary conjunctivitis. - Corneal edema & vascularization
IOL IMPLANTATION (Cataract surgery)	See before.

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Sheet

DD of Senile cataract	Causes of HM	R/F of OAG
DD of Red eye	Causes of astigmatism	R/F of ACG
Causes of complicated cataract	Causes of asthenopia	Drugs of OAG
Causes of Myopia	Causes of 2ry glaucoma	Causes of E. lenitis

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- Lens Induces
- Retinal Induced → Vascularization